WE CLAIM:

1. A method of generating a wave division multiplexed (WDM) optical signal in order to reduce non-linear signal degradation effects on neighboring optical channels, comprising the step of delivering optical waveforms conveyed over the neighboring optical channels to a multiplexer for generating the optical signal in a condition that reduces a probability of correlation between bit patterns of the optical waveforms conveyed over the neighboring optical channels.

2. A method as claimed in claim 1 wherein the step of delivering comprises a step of regulating transmitters of respective optical waveforms to ensure that each transmitter transmits a respective optical waveform at a phase offset with respect to phases of transmitters for neighboring optical channels.

3. A method as claimed in claim 2 wherein the step of regulating transmitters comprises a step of offsetting respective clock signals governing the respective transmitters for the neighboring optical channels enough that dispersion acting on the optical signal as it is transmitted over a WDM optical link does not cause the optical waveforms to become re-aligned as the optical link is traversed.

4. A method as claimed in claim 1 wherein the step of delivering comprises a step of adjusting optical path

lengths between respective transmitters for the respective optical channel, and the multiplexer.

5. A method as claimed in claim 4 wherein the step of adjusting optical path lengths comprises steps of:

calculating an optical path length required for neighboring optical channels to prevent dispersion acting on the optical signal as it is transmitted over a WDM optical link from causing the optical waveforms carried on the neighbouring optical channels to become re-aligned as the optical link is traversed; and

provisioning patch cords having the respective calculated optical path lengths between the respective transmitters and the multiplexer.

6. A method as claimed in claim 1 wherein the step of delivering comprises steps of:

receiving respective data signals at each of a plurality of transmitters for transmitting a respective one of the optical waveforms;

encoding each of the data signals using a respective encoding scheme selected to reduce data correlation on neighboring optical channels; and

transmitting the encoded data signals to the multiplexer.

7. A method as claimed in claim 6 wherein the step of encoding comprises steps of:

generating a respective scrambling pattern for each of the transmitters so that different scrambling

patterns are generated for transmitters for neighboring optical channels; and

applying the respective scrambling patterns to respective data signals to be transmitted over the respective neighboring optical channels.

8. A method as claimed in claim 7 wherein the step of applying the respective scrambling patterns comprises steps of, at each transmitter:

aligning bits of the scrambling pattern with bits of the data signals with reference to a predefined starting point in the scrambling pattern; and

applying a reversible boolean operation to the aligned bits, to generate an encoded data signal.

9. A method as claimed in claim 6 wherein the step of generating a respective scrambling pattern for each of the transmitters comprises steps of:

generating a pseudo-random bit sequence;

extracting from the pseudo-random bit sequence, in accordance with a predefined algorithm, a scrambling pattern for each of the neighboring optical channels, so that the extracted scrambling patterns are substantially decorrelated at any given offset.

10. A method as claimed in claim 9 wherein the step of extracting comprises a step of removing segments from the pseudo-random bit sequence, each of the segments being used as a rotating scrambling pattern.

11. A method as claimed in claim 6 further comprising a step of selecting a decoding scheme to apply to data received on the neighboring optical channels.

12. A method as claimed in claim 11 wherein the step of selecting comprises reading a hardware configuration setting in a decoder circuit of a receiver for the optical channel.

13. A method as claimed in claim 11 wherein the step of selecting comprises a step of reading a memory that stores a decoding scheme received in a message when the optical channel was commissioned.

14. A method as claimed in claim 11 wherein the step of selecting comprises a step of searching through a predefined set of decoding schemes adopted to decode data received on the optical channel.

15. A method as claimed in claim 14 wherein the step of performing a search procedure comprises at least one iteration of the steps:

selecting a decoding scheme;

applying the selected decoding scheme to at least a part of the data;

calculating a bit error rate for the decoded data; and

determining if the bit error rate is below a predetermined threshold.

16. A system for generating a wave division multiplexed (WDM) optical signal, comprising:

an optical transmitter for generating a respective optical waveform for each channel in the WDM optical signal;

a multiplexer connected to the optical transmitters, the multiplexer being adapted to multiplex the respective optical waveforms into the WDM optical signal; and

means for delivering the respective optical waveforms to the multiplexer in a condition in which a probability of correlation between bit patterns of the optical waveforms conveyed over neighboring ones of the channels is reduced.

17. A system as claimed in claim 16 wherein the optical transmitters are adapted to transmit the respective optical waveforms asynchronously with respect to transmitters for the neighboring optical channels.

18. A system as claimed in claim 17 wherein each of the optical transmitters comprises a clock offset circuit that is adapted to offset a synchronizing clock signal by a predetermined time interval that is different from an offset applied by the clock offset circuits of transmitters for the neighboring channels.

19. A system as claimed in claim 17 wherein the predetermined time intervals are calculated to ensure that the optical waveforms are not initially aligned,

and do not become re-aligned by an influence of dispersion during transit through an optical link.

20. A system as claimed in claim 17 wherein the means of delivering the respective optical waveforms comprise optical fiber patch cords having different optical path lengths, so that the optical waveforms carried on neighboring channels are not synchronized when delivered to the multiplexer.

21. A system as claimed in claim 20 wherein a difference between the optical path lengths traversed by the optical signals is calculated to ensure that the optical waveforms of neighboring optical channels are not aligned when delivered to the multiplexer and do not become re-aligned by an influence of dispersion during transit through an optical link.

22. A system as claimed in claim 16 wherein the means for delivering the respective optical waveforms comprises a scrambler for each respective transmitter, the scrambler being adapted to apply a respective scrambling pattern to a data signal to be transmitted by a respective transmitter.

23. A system as claimed in claim 21 wherein each respective transmitter is further adapted to extract a respective scrambling pattern from a pseudo-random bit sequence, and each scrambling pattern is extracted so that scrambling patterns for the neighboring channels are substantially decorrelated in any allignment.

24. A WDM optical signal comprising at least two neighboring channels travelling in an optical fiber, wherein optical waveforms associated with the respective neighboring channels are transmitted asynchronously.

25. A WDM optical signal comprising at least two neighboring channels travelling in an optical fiber, wherein optical waveforms associated with the respective neighboring channels carry data that is substantially uncorrelated at any point along the optical fiber.